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committee), Mr. J. L. Luddington (chairman of the chemical committee) and Mr. C. Colman-Rogers (chairman of the botanical committee) as *ex officio* members.

The chemical committee recommended that the society should form a fund definitely reserved for research, into which payments should be made as funds allow. The following paragraphs summarize their proposals:

(a) That the results of the past experimental work of the society should be collated, abstracted and published.

(b) That the society should continue to devote part of its scientific energies to agricultural research, and should at once establish a separate fund for its support.

(c) That members of the society be invited to make suggestions as regards practical problems which they consider require experimental investigation.

(d) That members of the society be invited to cooperate, by the provision of land, stock, etc., in carrying out such work.

(e) That scientific institutions as occasion arises be asked to aid the society in the elucidation of problems that can not be dealt with on an ordinary farm.

(f) That a research committee of eight members be set up, to review proposals and to initiate and supervise experiments.

(g) That the research committee should submit to the council in November estimates for the forthcoming year's work, and in March a report on, and the audited accounts for, the work of the last year.

(h) That arrangement be made at once for the publication of past experimental results, and that experiments be initiated as soon as possible.

The committee points out that the society has successfully undertaken a large amount of valuable and varied experimental work, not only at Woburn, but elsewhere, and results of much service to agriculture have thereby been secured. The work has included the manuring of crops and grass, green manuring, sowing down land to grass, the quality of seeds, finger and toe in turnips, the treatment of farmyard manure, cheese making, the fattening of cattle, sheep and pigs, and the rearing of calves. The results are reported in the *Journal*, but, although available, are not convenient of access. The committee believes that

farmers and students would benefit greatly if the society would issue, in at least two volumes, one dealing with crops and the other with stock, the experimental results it has achieved. A substantial fee would have to be paid for the work, but there should be no difficulty in finding a firm who would relieve the society of any financial responsibility in respect of publication.

The committee holds that further experimental work is vital to the interests of the society. For "research without reference to utilitarian ends" the society is not fitted, either in respect to technical equipment or of personnel; but it is eminently qualified to undertake research which deals directly with problems that arise in practice. Its members consist largely of practical farmers with long experience of the land and of the difficulties and problems of its cultivation.

At the moment the committee suggests that the following questions might well engage the society's attention:

(a) The value of ground mineral phosphates, more particularly in the improvement of pasture.

(b) The use of various forms of lime on grass and tillage crops.

(c) The use of wild white clover, wild red clover, bird's foot trefoil, etc., in laying land down to grass.

(d) The profitable utilization of whey.

MOLDING SANDS

THE Committee on Molding Sand Research under the guidance of Division of Engineering, National Research Council, and the American Foundrymen's Association, has made progress in its program of research. The United States Geological Survey and the various state geological surveys have promised to cooperate with the sub-committee dealing with this phase of the work under the chairmanship of Professor H. Ries, of Cornell University. This sub-committee has prepared a letter of instructions to the state geological surveys, which will standardize methods of making the surveys of molding sand resources.

Work on standardization of tests is well under way. Questionnaires have been sent out to gather information on the present methods of testing physical properties of sand. A

digest of replies to these questionnaires is expected to be available shortly.

Many firms and universities have offered to cooperate in the research work. Every endeavor will be made to maintain their interest and to assign problems to those universities and industrial laboratories offering to cooperate; due regard being given to the facilities and talent available. A list of research subjects has been compiled, which is given in part below:

1. Recovery of used molding sand through restoring bond to the sand by subjecting it to contact with water vapor under high pressure.
2. The effects of additions of certain chemical reagents upon the physical properties of clays and clayey materials, such as molding sand.
3. Effects of water content on the bond and permeability of a molding sand.
4. Effects of different water per cents. in molding sand on the milling and drilling speeds of light gray iron castings.
5. Research on fusion quality of facings (function of "peeler").
6. Tests of various kinds of clays for restoring bond to molding sand.
7. Comparison of the life of different molding sands.
8. Effects on plasticity of bond in molding sand and reduction of water content when using oil.
9. Effects of wet and dry storing of sand on bonding quality.

The American Steel Foundries Company has permitted a representative of the committee to make a digest of the sand reclamation work carried on by the engineering staff of the A. S. F. and has assisted in the preparation of this digest. Because of the scarcity of steel molding sand of the best quality and the problems arising from having to dispose of large quantities of refuse sand, this company has carried out an extensive investigation of methods of reclaiming the good material which is usually lost, whenever the so-called refuse sand is thrown away. After experimenting along different lines and thoroughly going over methods employed in other plants, a process of reclaiming old sand called "centrifugal scrubbing" was developed.

After establishing the principle of this method, equipment was designed which permits a recovery of about 70 per cent. of refuse sand. Cost figures for 1921 show that a ton of reclaimed sand costs about \$1 per ton against the cost of new sand, at the plant, of \$2.65 to \$3.85 a ton. The process involves cleaning the sand grains of adhering fused material, then separating by air currents the good sand from the bad material. Included in the 30 per cent. loss is some good bonding material which, because of its similarity to bad material, can not be economically separated.

The report covers the theory of sand reclaiming, centrifugal air scrubbing process, cost of reclaiming sand by the latter process, and a description of the proposed sand reclaiming unit.

THE BRITISH INDUSTRIAL FATIGUE RESEARCH BOARD

THE second annual report of the Industrial Fatigue Research Board has recently been issued. As reported in the *British Medical Journal* it contains "a comprehensive summary of the chief results obtained by the board since its inception some three years ago. These results have been published in a series of sixteen reports, which represent the output of the board's investigators over a period of about two years, for there is necessarily a considerable delay before the results of the inquiries reach the stage when they are ready for publication. If any critic had doubts as to the value of the board's work, and the importance of its further development on the lines laid down in this report, we think that such doubts would speedily be laid to rest by an impartial study of its pages. They contain a solid body of information which is of direct value to employers of labor, and to welfare workers and factory inspectors; the practical application of this information to the remedy of adverse industrial conditions would produce a very real improvement in the health and efficiency of the workers. In the analysis of published work with which the report opens the various tests of efficiency and fatigue employed are briefly described, and then a more detailed account is given of the results obtained in various indus-